# GSF briefing note on maritime emissions

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This is the second edition of the Global Shippers' Forum (GSF) briefing paper on maritime emissions. The first edition, published in November 2011, analysed the myriad embryonic schemes and proposals tabled by governments, the shipping industry and other NGOs to reduce maritime greenhouse gas (ghg) emissions.

Since 2011, the discussion about the most appropriate market-based measure (MBM) to be adopted has continued in the IMO and elsewhere. Some schemes and proposals have been modified and new proposals have emerged, not least by the European Commission which at the time of finalising this briefing paper has announced that it intends to introduce an emissions monitoring scheme based on fuel consumption to curb shipping emissions in early 2013, see page 16. Changes to the proposed schemes and proposals are fully examined and documented in this second edition briefing paper, together with new developments.

In addition, the question of the shipper’s role in the determination of an appropriate MBM is considered and advanced further. While the IMO recognised in its second report on ghg emissions that decarbonisation of maritime transport required the active participation of wider stakeholders, the views of shippers have so far largely been overlooked, and it is a regrettable fact shippers have still to receive formal recognition within IMO. Yet shippers have much to offer in the current debate, and as illustrated in this report are main drivers behind shipper-led collaborative efforts to reduce maritime emissions.

The GSF believes that industry needs a set of predictable and uniform global regulations to reduce greenhouse gas emissions, but it is essential that these regulations are transparent and practical. They must, however, be effective in actually reducing emissions and not simply adding additional cost which will be ultimately borne by shippers. Moreover, regulators should not overlook practical industry-based schemes that can achieve real tangible progress in reducing shipping emissions.

The GSF hopes that this second edition will continue to form the basis of wide-ranging discussions with the shipping industry, governments and international organisations about the best way forward for the shipping sector to reduce ghg emissions.

Chris Welsh
Secretary General, Global Shippers’ Forum

The Global Shippers’ Forum (GSF) is the global voice for shippers, created in 2006 as the successor to the Tripartite Shippers’ Group, first organised in 1994. Like the Tripartite Shippers’ Group, the GSF represents the interests of shippers from Asia, Europe, North and South America and Africa. The GSF is focused on the impact of commercial developments in the international freight transportation industry and the policy decisions of governments and international organisations that affect shippers and receivers of freight. The GSF was formally incorporated and registered as a non-governmental organisation in the United Kingdom in June 2011.
Between 75 to 85 per cent of the world’s manufactured goods are transported in containers.

In 2007, around 141 million loaded 20 foot containers moved across the oceans.

The value of the liner shipping industry to the global economy exceeds US$400 billion a year.

Over 50,000 merchant ships in over 150 flag states are registered in the world shipping fleet.

If containers from a single voyage of an 11,000 TEU ship were transported by train, it would need to be 77 kilometres (44 miles) long.

There has been a 35 per cent improvement in fuel efficiency from 1985 to 2008 for a 4,500 TEU (20 foot equivalent) ship and a 75 per cent improvement from a 1,500 TEU ship of 1976 to a 12,000 TEU ship of 2007.

“Shipping has always provided the only really cost-effective method of bulk transport over any great distance and the development of shipping and the establishment of a global system of trade have moved forward together, hand-in-hand.”

Koji Sekimizu
Secretary-General, 
International Maritime Organization
IMO’s Marine Environment Protection Committee (MEPC) 62 in summer 2011, when 49 countries adopted the Energy Efficiency Design Index (EEDI) for new ships and the Ship Energy Efficiency Management Plan (SEEMP) for all ships. Despite these agreements, progress is still yet to be made on adopting an MBM and in January 2012, the European Commission launched a public consultation for a regional MBM. There is also divided opinion as to the contribution developing countries should make to reducing maritime emissions in proportion to developed nations.

As ships are registered in a large number of countries and operate regularly between ports in over 200 countries, the Global Shippers’ Forum (GSF) believes that industry needs a predictable and uniform set of global regulations to reduce greenhouse gas (ghg) emissions that is workable for both developed and developing countries who are at different stages with regards to their economy and trading. Most importantly it is vital that an MBM will actually succeed in making the emission reductions required and not simply add additional cost to ship owners and ultimately shippers.

This second edition briefing paper examines the proposed MBMs to curb emissions put forward by industry organisations and governments across the world including a global cap and trade system, environmental compensation funds and energy efficient incentives. The briefing paper also presents how the shipping industry is making efforts to decarbonise despite the slow pace of reaching an agreement on a suitable MBM. It is essential that the GSF presents the most equitable scheme for ship-owners and shippers alike to the IMO against a backdrop of international climate change talks and Europe’s plans to set up a regional scheme.
The climate change challenge

The scale of the problem

In November 2007, the World’s Intergovernmental Panel on Climate Change (IPCC) concluded once and for all that global atmospheric concentrations of ghg emissions have increased as a result of human activities. Global temperatures are expected to rise by 2°C by 2100. The world therefore needs to reduce, or, at the very least, stabilise CO$_2$ concentrations to ensure temperatures do not rise further to avoid ‘dangerous’ climate change. Shipping like any other transport sector will be expected to make a contribution to reducing emissions and more often than not holds the spotlight for transport’s emissions due to the global nature of the industry.

The global landscape

In December 2009, leaders from around the world met in Copenhagen to begin negotiating a new international agreement on climate change to replace the Kyoto Protocol which expires end 2012. The Summit was largely deemed unsuccessful, however the following year in Cancun, Mexico, more than 190 countries managed to put discussions back on track and an international commitment to ‘deep cuts’ in global greenhouse gas emissions’ to hold the increase in global average temperature below 2°C was agreed. At the next Climate Change Summit at Durban in late 2011, an agreement was made on a second commitment period under the Kyoto Protocol and on a process to develop and adopt a universal legal agreement on climate change not later than 2015. A Green Climate Fund and a work programme on long-term finance to identify funding sources, potentially from international shipping, was also established. Meanwhile the Durban Platform for Enhanced Action was devised to ensure UN countries set ghg reduction targets by 2020. At the following United Nations Framework Convention on Climate Change (UNFCCC) held in Bonn in May 2012, much of the technical and legal detail required to extend the Kyoto Protocol was clarified. However, plans to set out a workplan to put the legal agreement on climate change into force failed to materialise. It is hoped that more positive progress can be made in Doha, Qatar in November 2012. Yet, there still remains a question mark over who will ratify the Kyoto Protocol’s second commitment period as Canada and Japan have dropped out and the US never ratified the original 1997 accord.

At Durban, the progress made by IMO in adopting energy efficiency regulations for shipping was noted. Despite the breakthrough achieved in July 2011 in adopting energy efficiency standards, IMO reported to Durban that in the long-term a market-based measure (MBM) will also need to be adopted to make significant ghg emission reductions given projections for world trade. Ahead of the conference, a study assessment of IMO mandated energy efficiency measures for international shipping was launched (page 45). Several delegations expressed their support to the work of IMO and urged the UNFCCC process to respect the fundamental principles of IMO, stressing that ship emissions could not be attributed to any particular country or economy and that any regulations should apply equally to all merchant ships engaged in international trade. There was also agreement at Durban to establish a ‘Green Climate Fund’ to help mitigation and adaptation projects in developing countries.

The IMO also reports to the Subsidiary Body for Scientific and Technology Advice (SBSTA) of the United Nations at annual conferences. At the last meeting in May 2012 in Bonn, IMO updated SBSTA on its work to improve energy efficiency in international maritime transport and reduce ghg emissions. IMO, alongside the International Civil Aviation Organization (ICAO), must continue to report at future SBSTA sessions on its progress.

At Rio20+ Conference, world leaders, alongside governments, the private sector, NGOs and other groups came together to review how the world can protect the environment and reduce poverty. This conference marked the 20th anniversary of the 1992 Earth Summit held in Rio where countries adopted Agenda 21 to rethink economic growth and ensure environmental protection. Rio20+ focused on two key themes; the creation of a green economy and a framework for sustainable development. The conference gave IMO the opportunity to renew its commitment to sustainable maritime development.
The shipping challenge

Against this political landscape, there is currently no international agreement on reducing GHG emissions from the shipping industry. According to the IMO, international maritime shipping makes up 2.7 per cent of global greenhouse gas emissions, a relatively small contribution compared to other sectors especially road transport. However, inevitably, the shipping industry will be expected to make some form of climate change commitment as, left unchecked, emissions from shipping could increase by 150 to 200 per cent between 2007 and 2050. In 1997, the Kyoto Protocol acknowledged that shipping emissions could not be attributed to any particular national economy and that multilateral collaborative action would be the most appropriate means to address emissions from the maritime transport sector. The responsibility for reducing bunker emissions from shipping was assigned to developed (Annex 1) countries working through the IMO. Charity groups are campaigning to see the incorporation of shipping emissions in global agreements on climate change. Meanwhile Governments and industry associations are also developing their own proposals as to how emissions from shipping should be curbed.

### Source: IMO Second GHG Study 2007

<table>
<thead>
<tr>
<th>Sector</th>
<th>CO₂ Emissions</th>
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<tbody>
<tr>
<td>International shipping</td>
<td>21.35%</td>
</tr>
<tr>
<td>Domestic shipping and fishing</td>
<td>18.2%</td>
</tr>
<tr>
<td>Electricity and heat production</td>
<td>15.3%</td>
</tr>
<tr>
<td>Other</td>
<td>4.6%</td>
</tr>
<tr>
<td>Other energy industries</td>
<td>1.9%</td>
</tr>
<tr>
<td>Manufacturing industries and construction</td>
<td>0.5%</td>
</tr>
<tr>
<td>Road transport</td>
<td>0.6%</td>
</tr>
<tr>
<td>Rail</td>
<td>0.1%</td>
</tr>
<tr>
<td>International aviation</td>
<td>0.6%</td>
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Global CO₂ emissions.
The IMO has agreed the following nine key principles for the development of regulations on CO₂ from the shipping industry.

1. Effectively reduce CO₂ emissions
2. Be binding and include all flag states
3. Be cost effective
4. Not distort competition
5. Be based on sustainable development without restricting trade and growth
6. Be goal-based and not prescribe particular methods
7. Stimulate technical research and development in the entire maritime sector
8. Take into account new technology
9. Be practical, transparent, free of fraud and easy to administer

To facilitate progress, the IMO has delegated to its Marine Environment Protection Committee (MEPC) responsibility for developing mandatory instruments to reduce ghg emissions from the shipping industry; this body holds sessions once or twice annually. Governments and associations submit proposals and views on MBMs to the Committee and delegations from countries across the world attend the sessions to put forward their views on shipping matters. The committee believes that an MBM for the shipping industry could offset growing ship emissions, provide incentives for the maritime industry to invest more in fuel efficient ships and operate ships in a more energy efficient manner. The measures could also generate funds to mitigate climate change in developing countries.

A working group for ghg emissions from ships was also established by MEPC to provide the committee with clear advice as to what MBM should be chosen to ensure the maritime sector reduces its emissions. A summary of the third intersessional meeting of the working group is in Annex 5.

MBMs proposed by Governments and shipowners or shippers’ associations can be broadly split into five main categories. All the proposals are global approaches to avoid creating an uneven patchwork of national or regional regulations. Governments or associations may support a particular MBM concept but there are significant differences between the parties on how the MBM is actually applied.

<table>
<thead>
<tr>
<th>International GHG fund/ form of levy</th>
<th>Emissions Trading Scheme</th>
<th>Hybrid scheme based on EEDI</th>
<th>Rebate mechanism</th>
<th>Port-based scheme</th>
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<tr>
<td>International Chamber of Shipping (ICS), Cyprus, Denmark, Marshall Islands, Nigeria, Republic of Korea, International Parcel Tankers Association (IPTA)</td>
<td>France, Germany, Norway and the UK</td>
<td>World Shipping Council (WSC), Japan, USA, Bahamas</td>
<td>International Union for Conservation of Nature (IUCN)</td>
<td>Jamaica</td>
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The 2010 proposals were subsequently consolidated in 2011 following alliances forged between Governments and associations (as shown below).

<table>
<thead>
<tr>
<th>2010 proposals</th>
<th>2011 proposals</th>
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<tr>
<td>An international fund for greenhouse gas emissions from ships – Cyprus, Denmark, the Marshall Islands, Nigeria and IPTA</td>
<td>An International Fund for Greenhouse Gas emissions from ships – Cyprus, Denmark, the Marshall Islands, Nigeria, IPTA and Republic of Korea</td>
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<tr>
<td>A further outline of a global emissions trading system for international shipping – Norway</td>
<td>A Global ETS for International Shipping – France, Germany, Norway and the UK</td>
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<td>A global ETS for greenhouse gas emissions from international shipping – UK</td>
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<td>Further elements for the development of an ETS for international shipping – France</td>
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<tr>
<td>Impact of an ETS with a particular view on developing countries – Germany (note this was submitted as an impact assessment not a proposal)</td>
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<td>Leveraged Incentive Scheme to improve the energy efficiency of ships based on the international ghg fund – Japan</td>
<td>Efficiency Incentive Scheme (EIS) – Japan and WSC</td>
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<td>Proposals to establish a Vessel Efficiency System (VES) – WSC</td>
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<tr>
<td>Proposal to reduce greenhouse gas emissions from international shipping – the United States</td>
<td>Ship Efficiency Credit Trading with Efficiency Standards (SECT) – United States</td>
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<tr>
<td>Market-based instruments: a penalty on trade and development – the Bahamas</td>
<td>Alternatives to market-based measures – the Bahamas</td>
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The MEPC has acknowledged that a feasibility study submitted to MEPC 61 on MBMs had concluded that all MBM proposals currently under review could be implemented, however it is clear that analysis of possible impacts of introducing an MBM for international shipping, in particular for developing countries, needs to continue. At MEPC 63 in early 2012, it was agreed that a further impact assessment of proposed MBMs should be prepared and that its focus should be on possible impacts on consumers and industries in developing countries. The impact assessment summarised in Annex 6 will cover the above 2011 proposals and the International Union for Conservation of Nature’s (IUCN) rebate mechanism. Prior to MEPC 64, interested parties were asked to ensure that they submitted any final MBM proposals to the Committee to be considered within the impact assessment. Note that China submitted its views on the impact assessment (Annex 7).

At MEPC 64 in October 2012, the following objectives have been set.

* To discuss the draft MEPC resolution on the promotion of Technical Co-operation and Transfer of Technology relating to the improvement of energy efficiency of ships*

* To consider draft terms of reference for MBM impact assessment

* Further debate on MBMs and climate finance

* To consider a reduction target for international shipping

*The Promotion of Technical Co-operation and Transfer of Technology relating to the improvement of energy efficiency ships aims to set up a specific framework for developing countries who are currently not subject to the EEDI or SEEMP.*
Main outcomes from MEPCs on ghg emissions from shipping since 2009

| MEPC 63 – February 2012 | Considered and agreed on the need for a continued impact assessment of proposed MBMs with focus on possible impacts on consumers and industries in developing countries
Adopted four sets of guidelines to assist in the implementation of EEDI and SEEMP:
2012 Guidelines on the method of calculation of the attained EEDI for new ships
2012 Guidelines for the development of a SEEMP
2012 Guidelines on survey and certification of the EEDI
Guidelines for the calculation of reference lines for use with the EEDI
Agreed on updated work plan for the development of further guidelines and the development of energy efficiency frameworks for those ships not covered by the current EEDI regulations |
| MEPC 62 – July 2011 | Committee adopted revisions to MARPOL Annex VI introducing EEDI (Energy Efficiency Design Index) and SEEMP (Ship Energy Efficiency Management Plan) from 2013
Received Intersessional Working Group report on MBM proposals |
| MEPC 61 – September 2010 | Majority agreed regulatory text for EEDI and SEEMP
Intersessional Working Group established in relation to MBMs
Received Expert Group review on MBM proposals |
| MEPC 60 – March 2010 | Agreement reached on the way to proceed in relation to MBMs
Expert Group to review MBM proposals and submit report to MEPC 61 |
| MEPC 59 – July 2009 | Agreement to disseminate a package of interim and voluntary technical and operational measures to reduce ghg emissions
Agreement on work plan for further consideration of MBMs |
Proposed schemes to make further reductions in decarbonising shipping

An international fund for greenhouse gas emissions from ships – Cyprus, Denmark, the Marshall Islands, Nigeria, IPTA and Republic of Korea

The international ghg fund is essentially a surcharge on bunker fuel and is often referred to as the ‘bunker levy’. The proposal is modelled on the International Oil Pollution Compensation scheme. The aim of the fund is to provide a straightforward approach to reducing fuel consumption and ghg emissions through a financial incentive with low administration costs. Shipowners would be required to pay a surcharge on every tonne of bunker fuel purchased above an agreed global ghg reduction target for shipping. Proposers believe that although technical and operational measures could deliver CO₂ reductions for individual vessels, these measures will not be sufficient to make deep enough emission cuts. The fund would regulate ships rather than states and apply to all ships engaged in international shipping over an agreed threshold (over 400 gross tonnes – GT) and to all fossil fuels. It is expected that around 60,000 ships would be covered.

The proposal would set a global reduction target (established by either the UNFCCC or IMO) against a baseline of possibly either 1990, 2005 or 2007. There would be no cap placed on emissions. Instead emissions above the agreed target would be offset by purchasing approved emission reduction credits. Offsetting activities would be financed by a contribution paid by ships on every tonne of bunker fuel purchased. As the cost of bunker fuel will rise due to the added ghg contributions, it is argued that shipowners will seek to save costs by ensuring that ships become more energy efficient and therefore use less bunker fuel per tonne mile. However, those opposing the international fund believe that the surcharge will inevitably be passed along the supply chain and provide little incentive for shipowners to make efficiencies. Contributions would either be collected through bunker fuel suppliers or via direct payments from shipowners and each ship would have an individual ghg account. The fund would pay for the offsets and be reviewed every four years so that the surcharge could be adjusted up or down depending on progress in meeting the target. According to the Expert Group of the MEPC, who conducted a 2010 review on MBM proposals, the amount paid per tonne of fuel would be a small percentage of a much larger fuel price. Based on a target line of 10 per cent below 2007 levels, the contribution rate is expected to represent less than 2 per cent of fuel costs in 2020 and less than 4 per cent of fuel costs in 2030. The proposers of the fund report that the introduction of a ghg contribution will potentially have none or very limited impact on the price of commodities transported by sea. The freight rate by sea, consisting of fixed and variable costs plus the ghg contribution, will only affect part of the total costs. However, this means that for a containership, a ghg contribution of for instance $45 per tonne bunker fuel will potentially increase the freight rate by 5 per cent, with the potential impact on the price of commodities being less than 1 per cent. Even for commodities with high freight rate shares of the price, the ghg contribution will potentially only increase the price by 1.9 per cent. Revenues raised by the scheme should fund both in-sector and out-of sector projects. The proposal in particular highlights that funds should be allocated to least developed countries (LDCs) and small island developing states (SIDS). Revenues will also cover the administration cost of a fund administrator as well as research and development activities for the shipping industry.

A global ETS for international shipping – France, Germany, Norway and the UK

A global emissions trading system (ETS) for international shipping is considered to be an effective, cost efficient and equitable mechanism that can provide for reliable emissions control in the shipping sector. It avoids the development of regional carbon schemes and does not restrict the growth of world shipping. Emission trading would require every ship subject to the regulation, to surrender one emission allowance for each unit of CO₂ it emits. The shipowner has the choice to invest in reduction measures, to purchase emission allowances from other ships or from outside the maritime sector. Ships would be registered and have an account in an international ETS registry and acquire emission allowances to be periodically surrendered. Shipowners would need to keep records of their bunker consumption. Parts of the revenue from the ETS could be used as compensation for developing countries for undesirable economic impacts that an MBM can bring. Critics of a global ETS argue that it relies too much on offsetting emissions and that the system could be manipulated so that allowances are purchased at their lowest level and the desired emission cuts not made.
In 2010, an Expert Group on MBMs considered several proposals on possible ETSs that met IMO principles and had been submitted to the MEPC. As a consequence, it was decided that since the proposals had common features, they should be amalgamated into one overall proposal.

Norway had proposed that a sector-wide cap on net emissions from international shipping should be set and a trading mechanism established to facilitate the necessary emissions reductions, be they in-sector or out-of-sector. The ETS would apply to all CO$_2$ emissions from the use of fossil fuels by ships engaged in international trade above a certain threshold. Norway’s proposal also indicated that limited exemptions could be provided for specific voyages to small island developing states (SIDS). France’s proposal was very similar to Norway but gave additional detail on auction design. The UK’s proposal was also similar, however it was suggested that a two phase approach to the ETS is implemented with an initial phase where emissions are offset. Germany commissioned CE Delft to undertake an impact assessment of an ETS to the Expert Group, which concluded that the impact of a maritime ETS on the shipping sector and on different regions and countries is low (Annex 4). The study assumed a fuel price of $15 per tonne of CO$_2$ and found that the cost increase for 6 different vessel types ranged from 4 to 8 per cent of total operating costs. A major share of the cost increase could be passed on to shippers.

Later, in December 2011, Germany submitted a further paper on the results of a scientific study on the design and implementation of a worldwide maritime ETS. The German Federal Ministry of Transport, Building and Urban Development believes that an ETS will reduce emissions in a cost-effective way with the cap on emissions guaranteeing environmental effectiveness. Additionally, it reports that shipping experts, interviewed as part of the study, see there is no reason why in practice a cap-and-trade approach should not work within the shipping sector. They also comment that ship operators are open to a worldwide ETS. The study recommends that emissions should be monitored by voyage through bunker fuels, making the ETS less burdensome, as most ship operators should already have this data. Linking the ETS to other schemes and the banking of allowances would also increase their supply. However, a trial period is recommended before implementing a full ETS.

Alongside national governments, many industry bodies believe that a global ETS is required to achieve real and lasting reductions in CO$_2$ emissions from shipping as efficiencies in ship design and operation alone will not bring the significant reductions needed.

The national shipowner associations of Australia, Belgium, Norway, Sweden and the UK put forward a debate paper in 2009 for an emissions trading system which would comply with the IMO’s nine principles for global emissions reduction. The basis of the proposed cap-and-trade system for international shipping would be similar to that for land-based industries. Each regulated entity would have a certain number of carbon allowances that is either given or bought during a compliance period. Data regarding consumption would be
collected from fuel purchase records. At the end of the compliance period, each regulated entity would submit to the regulator a number of carbon allowances equal to its verified emissions during the period. If the entity has more allowances than it is required to surrender, then it will benefit either by retaining (or ‘banking’) the allowances it has not used or by selling them to the market. If it has to surrender more allowances than it already has, it will have to purchase these additional allowances in the market. Shipping companies would be able to purchase allowances in other existing and future emissions trading markets. The system would force operators to maximise their fleets and ensure efficient voyage planning, but would not limit the ability to meet the demands of world trade. A cap would also be placed on the shipping sector’s net contribution to atmospheric CO₂.

More recently, a two-phase approach to the implementation of the ETS has been proposed by the national shipowner associations. The first phase, expected to last at least 9 years, would be an enabling step in which the foundations would be laid for an ETS. There would be no cap or auctioning of emissions. Instead, shipowners would be required to offset their emissions from certified UNFCCC projects. The introduction of phase one would not commit the IMO to actually adopting an ETS. However, if the first phase was successful, the second would then move to the introduction of a cap and an emissions trajectory for the shipping sector, and auctioning of allowances.

Efficiency Incentive Scheme (EIS) – Japan and WSC

Japan and WSC favour an efficiency based standard rather than an ETS or bunker levy as they believe such proposals will have limited effect on the design and construction of more efficient ships but will increase the per-unit cost of moving goods by sea. Originally, Japan proposed a leveraged incentive scheme (LIS) to improve the energy efficiency of ships whereby shipowners would be required to pay a surcharge on fuel for all ships, but those meeting approved efficiency standards would receive a rebate. Whilst, WSC’s Vessel Efficiency Scheme (VES) avoided a rebate mechanism and sought to introduce a scaled fee system for ships, whereby those that reached the approved standards would not have to pay any fees.

The EIS proposal recommends the establishment of explicit efficiency standards on both new and existing ships in the world fleet. It would apply to all ship types and sizes for which the IMO has established an EEDI baseline and requirement to stimulate significant improvements in fuel and carbon efficiency. This would allow shipowners to fully avoid additional tonne-unit costs if it made the investments necessary to achieve the stipulated standard. Ultimately, the EIS provides an option to avoid recurring, additional operational costs.

New ships and existing ships will be required to meet certain efficiency standards, based on the EEDI. If these standards are not met, shipowners, operators or charterers will be required to pay fees in accordance with the amount of fuel consumed. It therefore provides an opportunity for shipowners to avoid any fees by ensuring that their ships satisfy the applicable standard. For ships that do not meet the required standard, fees would be assessed in proportion to the amount of bunker fuel consumed (or purchased) and the degree to which the ship’s efficiency falls short of a specific EEDI standard.

The fee would need to be set at a level that would motivate shipowners to make the necessary improvements, while leaving some flexibility for those business cases where paying the fee would be more practical, for example in the case of a vessel that is close to retirement.

The EIS would utilise the EEDI for both new and existing ships as was the case in the original proposal of VES by WSC. The calculation and verification of the EEDI for existing ships under the EIS would follow the same procedure as new ships, namely it would be carried out in accordance with the EEDI Calculation Guidelines and the EEI Survey and Certification Guidelines. However, there should be some device, in order to enable the assignment of EEDI for existing ships with reasonable level of accuracy, to cope with technical difficulties inherent in EEDI calculation for existing ships such as the lack of available and verifiable data.

Since maritime transport is vital to global trade and is the most carbon efficient form of transportation, establishing caps on maritime emissions is not considered appropriate. The method of collecting the contributions from ships would follow that of Japan's LIS. There would be a direct transfer to the IMO international ghg fund without passing through the bunker fuel
suppliers. Each ship would have its own electronic account with the IMO number. The revenue from ghg contributions would be allocated for further in-sector emissions reductions through research and development projects to develop even higher efficiency in the fleet and for funding out-of-sector projects; offsetting is discouraged. The allocation of revenues to be used outside the marine sector should take into account the share of emissions generated by international shipping relative to total global CO₂ emissions.

Critics of the EIS’s use of the EEDI believe that any MBM based upon EEDI does not take into account the varying nature of a ship’s operation that can affect fuel efficiency. For instance, in its proposal to the MEPC 64, the International Chamber of Shipping (ICS) asserts that the only consistent and straightforward measure of an individual ship’s energy efficiency is one which is related directly to the actual fuel consumption of that ship, either on individual voyages or over longer periods of time.

Ahead of the proposed MEPC Impact Assessment, Japan has submitted draft legal text for the EIS for MEPC 64. Japan asserts that the EIS has a number of commonalities with the international ghg fund scheme such as the collection of contributions based on the consumption of fuels from ships. However, Japan believes that an MBM which sets a global reduction target is inappropriate as it would lead to an outflow of money from the maritime sector. Japan accepts that concerns have been raised at MEPC that the EIS is designed in such a complex manner that it would be difficult to set the fee rates for individual ships and also apply the EEDI to existing ships correctly. Japan has therefore adjusted its position and proposes that the EIS takes a single flat fee rate for ships which do not meet a specific EEDI standard. Due to the backlash against the application of EEDI to existing ships, Japan appears to have removed the incentive mechanism for existing ships at this stage of negotiations. Existing ships will be required to continue to pay the contribution in the same manner as new ships which fail to obtain the necessary better EEDI threshold values. An existing ship that goes through a major conversion which is so extensive that the ship is regarded as a newly constructed ship will be subject to a survey to obtain an EEDI value and would therefore avoid the contribution payments. Furthermore, it is interesting to note that Japan has submitted these new proposals independently of the World Shipping Council (WSC).

Further MBMs are reviewed in Annex 3.
Alongside the debate of the most appropriate MBM for the shipping industry, there is also pressure for the sector to contribute to the Green Climate Fund. The purpose of the Green Climate Fund is to make a significant and ambitious contribution to the global efforts towards attaining the goals set by the international community to combat climate change.

The United Nations Climate Change Conference in Durban agreed to establish a 'Green Climate Fund' to help mitigation and adaptation projects in developing countries. At Cancun in December 2010, developed countries committed to provide new and additional resources for climate change activities in developing countries and to mobilise US$100 billion per year by 2020. It was agreed that financial resources should come from a wide range of private and public sources. However there have been proposals that some of this funding should be raised from international shipping, potentially through a linkage with an MBM. For example, the World Bank has proposed that funding might be raised via a charge on bunker fuel from international shipping.

A report submitted to G20 Finance Ministers in October 2011 entitled Mobilising Climate Finance has concluded that despite the economic situation faced by many countries, several sources can contribute to climate finance, while being practical and economically efficient.

- Removal of subsidairies on fossil fuel use
- Comprehensive carbon pricing such as carbon charge or emission trading with auctioning of allowances
- Market-based instruments for international aviation and maritime bunker fuels
- Carbon offset markets
- Private flows through public policies and measures

The report states that a globally co-ordinated carbon charge of $25 per tonne of CO$_2$ on fuels could raise approaching $25 billion per year from international maritime transport, while reducing emissions by around 5 per cent, mainly by reducing fuel demand.

Earlier this year in a public speech, Christine Lagarde, Managing Director of the International Monetary Fund (IMF) called for nations to speed efforts towards the introduction of a fiscal mechanism to apply a price to the environmental damage that their industries caused. She suggested that shipping and aviation industries could raise about a quarter of the US$100bn required to meet the objectives of the Green Climate Fund. The Chairman of the ICS, Masamichi Mooroka, publicly wrote to Lagarde arguing that any tax imposed on shipping emissions must be imposed by all nations and should be agreed through the IMO at a level commensurate to the industry’s contribution to global emissions, ie 3 per cent. Mooroka also warned against new market-based measures for shipping whilst economic conditions remain depressed. ICS has no objection to contributing, at some point in the future, to the Green Climate Fund, provided that the same charges apply to all ships internationally regardless of flag. Meanwhile, the Round Table of international shipping associations argues that any funds generated by means of a globally applied MBM for shipping must be controlled by IMO, and, in large part, be disbursed to support further technological development based on energy efficiency in shipping. However, the World Wildlife Fund (WWF) argues that revenue from MBMs could be used as climate finance for mitigation and adaptation actions in developing countries through the UNFCCC and Green Climate Fund. WWF notes that the report, Mobilising Climate Finance demonstrates revenue generating potential through a carbon pricing mechanism on international shipping and argues the need for rebates/compensation to ensure no net incidence on developing countries. The EU Council says carbon pricing is a potential source of revenue that would also generate the price signal necessary to efficiently achieve emissions reduction from these sectors. At MEPC 63, delegates considered the possible use of revenues from an MBM for international shipping under IMO and its relation with the wider efforts in the world community to mobilise climate finance for use in developing countries. A summary is provided in Annex 9.
EU Emissions Trading System

In 2005, the EU Emissions Trading System (formerly Scheme) was introduced creating a market for buying and selling carbon and to put a cap on emissions in Europe. The scheme covers power generation and intensive energy users in industry and enforces limits on carbon emissions on businesses in these sectors.

From 2012, aviation was also incorporated into the ETS. Virtually all airlines with operations to, from and within the EU fall under the scope of the directive, including non-EU airlines.

The EU agrees that addressing the reduction of ghg emissions from global shipping should take place through the IMO, however leaders have been frustrated at a lack of progress and threatened to introduce a regional MBM for shipping.

Assessing the introduction of an MBM

In January 2012, the EU launched a consultation to assess whether an MBM could be introduced for Europe only. At the time of writing, the EU was assessing the progress of the IMO before making a final decision on whether to introduce a regional scheme. Ultimately, the EU needs to make its own decision on whether to include ghg emissions of the maritime sector in its overall 20 per cent ghg reduction commitment. The policy options on whether to introduce a regional scheme considered in the consultation were:

- Compensation fund
  - Shipowners and operators have to contribute to the compensation fund, ie the polluter pays. A regional compensation fund could be established which could serve as a precursor for a global measure of the same nature.
  - A ship calling at an in-scope port would have to produce a certificate to prove it is part of a compensation fund. Flag neutral
  - Option 1 – a contribution to be paid for each tonne of CO₂ emitted
  - Option 2 – an overall target based on historical transport performance or emissions to be set and then contributions set accordingly

- Emissions Trading System
  - Ships would have to surrender emission allowances corresponding to their actual in-scope emissions. In order to limit its immediate economic impact, free allocation of allowances may be given during a transitional period. The ETS could allow purchase and selling of allowances to other sectors, not just shipping

- Annual tax on fuel or on emissions
  - A tax could be set on emissions monitored and reported

The emissions covered by an MBM would be for all vessels arriving at an in-scope port; all CO₂ emissions for the journey starting from the last port of call outside the scope of the measure to the first port called at within the EU. Additionally all vessels departing from an in-scope port, all CO₂ emissions for the journey starting from the departure port within the EU to the first port called at outside the scope of the measure would be included. Lastly, all CO₂ emissions from intra-EU journeys would be included in the scope of policy coverage. Utilising the IMO’s Energy Efficiency Index is not considered and neither are any incentive based schemes. The consultation which closed in April 2012 requested feedback from stakeholders on whether routes performed from or to a least developed country should be out of scope, whether any particular ship or vessel be excluded, and how might operators change journey patterns to avoid having to include their full emissions for a journey.

In October 2012 the European Commission announced that following the consultation, it intended to introduce an emissions monitoring system based on fuel consumption to curb shipping emissions in early 2013 but the exact MBM was not confirmed.

GSF believes that any market based mechanism should be global in application and that seeking to introduce a measure based on only one region risks distorting world trade, substantially to the disadvantage of businesses trading with and located in Europe.
The shipping industry is already a highly efficient mode of transport compared to road and rail. Shipowners are using a variety of technological and operational methods to improve ship efficiency and thus reduce GHG emissions. Technology advancements to improve ship efficiency such as advanced engine design, improved waste heat recovery and advanced propeller design are being implemented. There is also ship resistance technology which includes, but is not limited, to optimisation of hull shape and structure, application of low friction coatings, and use of stern fins or ducts. In particular there have been solutions developed for the problem of seaweed and crustaceans adhering to hulls and propellers resulting in increased propulsion resistance, which drops ship speed and increases fuel consumption. Ordinarily, antifouling paint can be used on ship bottoms to prevent encrustacean, but after the passage of time, organisms combat these and underwater cleaning is subsequently required, which is reported to provide fuel consumption savings of about 10 per cent; propeller polishing brings 1 to 2 per cent savings.

Many shipowners are implementing speed reductions, weather routeing and improved cargo management to maximise cargo carrying capacity. The most economical speed for container ships is 10 to 15 knots, therefore a number of shipping companies have reduced their speed from the standard 25 knots over the last few years. A study by Maersk Line in October 2011 has indicated that low speeds do not damage engines. Maersk vessels (two-stroke engine) sustained zero damage from slowing since the shipping line began lowering speeds to cut fuel costs in 2007. Some shipping companies also use analysis systems so that onshore operations staff can monitor ship statistics on a daily basis. In April 2012, container carrier APL announced it was on course to reduce carbon emissions by 30 per cent by 2015 based on 2009 levels due to the influx of new vessels running at reduced speed. The company will deploy 32 new vessels by 2015 and optimise vessel trim, speed and routeing to decrease emissions as well as improve maintenance on vessel hulls and to reduce drag in the water. Upgraded cargo handling equipment is also being installed at terminals. Meanwhile, NYK’s Ship Energy Efficiency Management Plan (SEEMP) and the company’s implementation procedure have been certified by Nippon Kaiji Kyokai (ClassNK) to be in compliance with the IMO Guidelines adopted by MEPC 63, making the company’s plan and implementation procedure the first in the world to receive this certification. Ahead of the international regulations, NYK formulated its own NYK Save-Bunker Manual by incorporating specific action plans aimed at efficient ship operation. By having each vessel make use of this manual since January 2009, NYK has been able proactively to enhance the efficiency of its ship operations. In addition, in the IBIS (innovative bunker and idle-time saving) project that NYK has implemented on its containerships to achieve optimal and economic ship operation, it has utilised a weather routeing service and effective management of vessel speed, just-in-time arrivals, and optimal trim, all of which have been recommended in SEEMP formulation guidelines as means to improve efficiency.
Maersk case study

“Collaboration between low-carbon leaders will play an increasingly important role in delivering large-scale supply chain emission reductions.”

Signe Bruun Jensen

Environment & CSR

Maersk Line

As the biggest container shipping line in the world, Maersk Line plays an important role in facilitating reliable and efficient supply chains worldwide. Additionally, as an enabler of global trade, we see environmental performance as a central component of our path towards sustainable, profitable growth.

Maersk Line’s ‘Triple-E’ vessels (Economy of scale, Efficiency and Environment) scheduled for delivery between 2013-2015, will set new standards for size, fuel and cost efficiency as well as reduction of greenhouse gas emissions. New hull, engine and propeller designs optimised for slow steaming mean that Triple-E vessels will produce 20 per cent less CO₂ per container moved compared to our most efficient vessels today, and 50 per cent less CO₂ than the industry average on the Asia-Europe trade lane. Triple-E will give Maersk Line’s customers access to the most energy and cost efficient mode of transportation in the world.

Fleet optimisation, including retrofits and performance management, also plays an important role in reducing Maersk Line’s greenhouse gas emissions. By monitoring and optimising the energy performance of individual vessels, Maersk Line has increased propulsion efficiency, saving 160,000 tonnes of fuel in just three years. Combined with other initiatives such as slow steaming, waste heat recovery, trim optimisation and basic load reduction, Maersk Line has already reduced its CO₂ per container moved by 16 per cent since 2007.

Maersk Line’s carbon reduction in numbers

- 8 per cent lower on CO₂ compared to industry averages
- 16 per cent CO₂ has been reduced per container since 2007
- 25 per cent CO₂ per container will be reduced before 2020 - if not more!
- 50 per cent CO₂ will be reduced by the upcoming Triple-E ships on Asia-Europe compared to current industry averages
- 748,000 tonnes of CO₂ saved by our key clients last year by shipping with Maersk Line compared to an industry average carrier

In the coming years, Maersk Line will continue to push the envelope through technology innovation, including research into alternative fuel sources such as biofuels. As customers look to reduce the impact of their supply chains, Maersk Line will also partner with leaders to make CO₂ performance a parameter for carrier selection. Ready to compete in a carbon constrained economy, we will push for 100 per cent transparency on environmental performance, enabling real customer choice and driving industry-wide emissions reductions.
IMO’s second greenhouse gas study identified significant potential for further improvements in energy efficiency, mainly through the use of existing technologies as noted above. In addition to the above fuel cutting measures, the IMO has also formally approved two new standards for improving the efficiency of ships. Significant reduction of emissions from ships due to EEDI and SEMMP regulations is foreseen to 2050 with emission reduction due to SEMMP (primarily operational measures) likely to be realised more rapidly than that for EEDI (primarily technical measures), as the effect of EEDI will occur only as and when older, less efficient, tonnage is replaced by newer tonnage.

Energy Efficiency Design Index

In July 2011, the IMO adopted the Energy Efficiency Design Index (EEDI) as a metric which sets a minimum energy efficiency standard for ships to ultimately reduce ghg emissions. Ships built between 2015 and 2019 will need to improve their efficiency by 10 per cent, rising to 20 per cent between 2020 and 2024 and 30 per cent for ships delivered after 2024. The EEDI is non-prescriptive and leaves the choice of technologies to use in a specific ship design to industry.

How the formula works

\[
\text{EEDI} = \frac{\text{CO}_2 \text{ emission}}{\text{transport work}}
\]

Regulated slow steaming

The Clean Shipping Coalition (CSC) has submitted proposals to the MEPC on the benefits of slow steaming to reduce fuel usage and the potential for regulated slow steaming. This operational measure has resulted in a significant reduction in ghg emissions and air pollutants. However, it is expected that as economies and markets recover from recession, speeds will increase again over time to meet growing demand. According to a new study commissioned by T&E and Seas at Risk and undertaken by CE Delft, ICCT and Professor Mikis Tsimpis of the University of Southampton, regulated slow steaming would not only reduce CO₂ and other emissions dramatically but actually make significant financial savings. Implemented carefully, for example by including certain provisions involving a fee for ships that need to travel faster, CSC believes that regulated slow steaming could provide industry with a flexible programme in which to meet global demand but also contribute to reducing greenhouse gas emissions.

The regulations will come into force on 1 January 2013 and initially cover ships that weigh more than 400 gross tonnes (GT). Oil and gas tankers, bulk carriers, general cargo ships, refrigerated cargo carriers and container ships which represent the largest and most energy-intensive segments of the world merchant fleet will be covered.

A group of countries led by China, Brazil, Saudi Arabia and South Africa secured a waiver to the EEDI for new ships registered in developing nations until 2019 to enable more time to acquire more advanced technologies. This could, however, potentially lead to ship builders from developed nations applying for a waiver until 2019 if they flag a ship in a developing country. However, a study by IMO has concluded that the likelihood of flag states or shipowners opting for an EEDI waiver is low, due to low compliance costs and commercial disadvantage of non-compliance.

Highlights of the study include:

- a 10 per cent reduction in fleet average speed results in a 19 per cent reduction of CO₂ emissions even after accounting for the emissions of additional ships needed to deliver the same amount of transport work and the emissions associated with building the necessary additional ships

- a ship speed reduction of 25 per cent leads to a reduction of main engine fuel consumption of approximately 58 per cent on a ship year basis

CSC proposes that regulated slow steaming could be agreed globally at the IMO or imposed by a state on the ships flying its flag. It is considered to be easy to monitor and enforce and may have a lower administrative burden than other proposed MBMs. Ultimately, regulated slow steaming would ensure that emissions in the maritime sector would be reduced, regardless of the fuel price and demand for shipping.
The CO₂ emission represents the total CO₂ emission from the combustion of fuel, including propulsion and auxiliary engines and boilers, taking into account the carbon content of the fuels in question. If energy-efficient mechanical or electrical technologies are incorporated on board a ship, their effects are deducted from the total CO₂ emission. The energy saved by the use of wind or solar energy is also deducted from the total CO₂ emissions, based on actual efficiency of the systems. The transport work is calculated by multiplying the ship's capacity (dwt), as designed, with the ship's design speed measured at the maximum design load condition and at 75 per cent of the rated installed shaft power.

The EEDI metrics cannot be applied to some propulsion systems (eg ships with diesel-electric, turbine or hybrid propulsion systems). For ship types not covered by the current metrics, suitable formulae were to be developed by IMO’s MEPC, to address the largest emitters first.

The International Chamber of Shipping (ICS) is cautious about the application of EEDI on existing ships arguing that the index’s formulation is unsuitable. Greenhouse gas emissions from ships in service are strongly influenced by how the ship is operated rather than the base energy efficiency level provided by the ship design. Routes, cargo loading patterns and required delivery times can have a high degree of variation that affects efficiency.

Ship Energy Efficiency Management Plan

The IMO has adopted a mechanism to help ship operators to improve the energy efficiency of existing ships known as the Ship Energy Efficiency Management Plan (SEEMP). The SEEMP provides an approach for monitoring ship and fleet efficiency performance over time using an Energy Efficiency Operational Indicator (EEOI) as a monitoring and benchmarking tool. The SEEMP urges shipowners and operators to consider new technologies and practices such as speed optimisation, weather routing, hull maintenance and improved voyage planning when seeking to optimise the performance of a ship. Many shipping associations are already encouraging companies to use the SEEMP on a voluntary basis. As fuel is the single highest operational cost factor, it provides an incentive for ships to be more energy efficient. SEEMPs will be mandatory for all ships from January 2013. The formulation of guidelines were adopted at the MEPC to support countries in their uniform implementation.

At MEPC 63, a set of four guidelines were adopted to provide sufficient lead time for administrations and industry to prepare.

1. 2012 Guidelines on the method of calculation of the attained EEDI for new ships
2. 2012 Guidelines for the development of a SEEMP
3. 2012 Guidelines on survey and certification of the EEDI
4. Guidelines for the calculation of reference lines for use with the EEDI

A further IMO study (see Annex 11) to assess the effect of the adopted measures reported that by 2020, about 150 million tonnes of annual CO₂ reductions are estimated from the introduction of the design index for new ships and the operational practices for all ships, a figure that by 2030 is projected to increase to 330 million tonnes of CO₂ annually. The average reduction in 2020 is expected to be approximately 14 per cent and by 2030 approximately 23 per cent when compared with business as usual. Of the projected reduction for 2020, 24 per cent (36.5 million tonnes) is associated with EEDI and 76 per cent (115 million tonnes) is attributed to SEEMP.
Amendments to the International Convention on the Prevention of Pollution from Ships (MARPOL), Annex VI Regulations for the prevention of air pollution from ships, add a new chapter on regulations on energy efficiency for ships.

The new chapter includes a regulation on Promotion of Technical Co-operation and Transfer of Technology relating to the improvement of energy efficiency of ships, which requires administrations, in co-operation with IMO and other international bodies, to promote and provide, as appropriate, support directly or through IMO to states, especially developing States, that request technical assistance. It also requires the administration of a party to co-operate actively with other parties, subject to its national laws, regulations and policies, to promote the development and transfer of technology and exchange of information to states, which request technical assistance, particularly developing states, in respect of the implementation of measures to fulfil the requirements of the chapter.

Model course for energy efficient operation of ships

IMO, together with the World Maritime University (WMU), have been developing a model course on SEEMP promoting the energy efficient operation of ships. The first draft of the model course was submitted to MEPC 62. It provides general background on the climate change issue and IMO’s related work and aims to build the different operational and technical tools into a manageable course programme, which will promulgate best practice throughout all sectors of the industry. The course will help create benchmarks against which operators can assess their own performance. The purpose of the IMO model course is to assist training providers and their teaching staff in organising and introducing new training courses, or in enhancing, updating or supplementing existing training material, so that the quality and effectiveness of the training courses may thereby be improved.

MEPC 62 agreed that the draft model course was an excellent start to providing a structured training course but that it required more work. MEPC 63 recognised that the draft model course had been further developed to include some tutorial examples, but further work was needed to align it with the 2012 Guidelines adopted at this session.

Voluntary Ship CO\textsubscript{2} Emission Indexing

In July 2005, the MEPC approved IMO’s Interim Guidelines for Voluntary Ship CO\textsubscript{2} Emission Indexing to help develop a methodology to describe the ghg efficiency of a ship in terms of its CO\textsubscript{2} emissions. The guidelines allowed shipowners and operators to evaluate the carbon performance of their ship/fleet with direct relation to the consumption of bunker fuel. The indexing also provided useful information on a ship’s performance with regard to fuel efficiency. Since the guidelines, the indexing trials from hundreds of ships have been submitted to IMO for information. The data has been reviewed and large differences in CO\textsubscript{2} indexing have been observed for almost identical ships on similar voyages. IMO has assumed that these differences are probably the result of differences in weather conditions and operational patterns (length of time of ballast voyages or time spent waiting in port areas, or whether the ship was fully laden). In 2007, IMO established a central database for the indexing results to make the data accessible for comparison and further studies.

Overall, huge credit has been accorded to the IMO in gaining a majority global agreement on the first ever energy efficiency regulations for ships. However, the IMO admits that the measures will not be sufficient to make the changes needed at a global level and has indicated that an MBM will still be required.

Shipper initiatives

The Carbon War Room

Outside the IMO initiatives have been set up to capture data on the efficiency of ships. The Carbon War Room, founded by a group of entrepreneurs, including Sir Richard Branson and Boudewijn Poelmann, is a project funded entirely from donations by philanthropists and companies. It has launched a website initiative, (shippingefficiency.org) to increase information flows around international shipping’s energy efficiency and ultimately to help reduce the environmental impacts. Website users can access a simple search function to compare one ship’s efficiency against another. Around 60,000 existing ships including the majority of the world’s container ships, tankers, bulk carriers, cargo ships, cruise ships and ferries are already captured within the project and have been given a rating between A and G. Vessels are grouped
by ship-class and compared to the closest 50, 100 or 200 vessels in that class by DWT, GT, TEU's and cubic metres, depending on vessel type, in order to obtain a more representative rating. The ratings use the EEDI as a methodology and data from the world's largest ship registry, IHS Fairplay. Shipowners and operators are encouraged to update their records in the Carbon War Room when efficiency improvements to their vessels have been implemented. The Clean Cargo Working Group's methodology for benchmarking ocean container vessels CO\textsubscript{2} efficiency against other vessels applying the same major container routes is also used in the project.

Clean Cargo Working Group case study

“Clean Cargo is a global cross-industry collaboration that provides over 30 shippers, carriers and third-party logistics companies the forum to share best practices and steer environmental improvements in freight transport, focused on the maritime segment. In setting the industry standard for calculating carbon emissions for container vessels and collecting primary data on over 32 environmental data points, the annual data sets provide shipping customers real and credible information they can easily use to set emissions reductions goals and work with like-minded companies”

Angie Farrag, BSR
Project Manager
Clean Cargo Working Group

The Clean Cargo Working Group (‘Clean Cargo’) is a global, business-to-business initiative dedicated to improving the environmental performance of marine container transport. Clean Cargo creates practical tools for measuring, evaluating and reporting the environmental impacts of global goods transportation, helping ocean freight carriers track and benchmark their performance and easily report to customers in a standard format. This process provides cargo owners (shippers) the ability to review and compare carriers’ environmental performance for their own reporting requirements and enables them to make more informed buying decisions.

Clean Cargo has developed the industry standard for calculating ocean container carbon dioxide emissions and works on aligning its emissions methodologies, including for SOx and NOx, with other industry initiatives. The group collects emissions data each year from reporting cargo carrier members – which in 2012 represented over 2,000 individual ships, more than 60 per cent of ocean container capacity worldwide – and distributes this information in easy-to-use scorecard format to member cargo owners.

Clean Cargo also conducts annual industry performance assessments and in 2012 the group aggregated average carbon dioxide emissions showed reductions over the past 2 years: 7 per cent from 2009 to 2010, and 6 per cent from 2010 to 2011. Whilst part of this decline is clearly driven by changes in carrier representation and global trade conditions, it is also likely due to improvements in carrier fleet efficiency and data quality.

Being almost a decade old, and representing a significant portion of the industry, Clean Cargo is uniquely positioned to continue driving improvements in carbon calculation methodology for the ocean segment, and supporting efforts to standardise emissions calculations and reporting across the entire logistics supply chain – collaborating with other initiatives, including COFRET and WEF, in these regards.

As the Clean Cargo system provides standardised calculation methodologies and reporting templates, members believe a key catalyst for change is scaling up the number of shippers using, and collaborating to improve on, the data and tools this group provides – thus greatly improving efficiencies in the amount of reporting that carriers are required to make to their customers, as well as the comparability of data that shippers use today. Such a step is critical to move from measurement and reporting to continuous improvement in environmental performance through the value chain.

Further links

Clean Cargo is a BSR Working Group.
For more information: www.bsr.org/en/cleancargo

Clean Cargo One-Pager

Clean Cargo Annual Trade Lane Emissions Factors Brief
Sustainable Shipping Initiative (SSI)

The Sustainable Shipping Initiative (SSI) is formed of leading shipping companies across the world to plan how shipping can contribute and thrive in the future. The SSI is working with Forum for the Future and WWF.

SSI signatories as at July 2012

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In May 2011, the group launched the Case for Action, identifying the principal global trends that will affect the maritime sector over the next 30 years. These include new patterns of trade, shifting global powers, rising fuel costs and changing customer demands. This work led to the creation of a shared Vision for 2040 backed by a series of specific actions to ensure that shipping has a sustainable and yet profitable future. On the issue of rising GHG emissions, the vision recognises that the industry must:

- pioneer/implement aggressive improvements in energy efficiency in new ship designs, retrofitting and operations
- actively seek renewable and other energy sources to encourage a step-change in shipping's energy portfolio to achieve significantly reduced GHG intensity
- pioneer methods for shipping's stakeholders to compare sustainability performance in order to drive improvement. Encourage shipping customers to make sustainability performance a key factor in selection and promote global adoption of an agreed set of performance standards
- support the development of co-ordinated and progressive legislation aimed at significantly improving social, environmental and economic sustainability across the shipping industry

Of key concern to the group is the lack of global co-operation or agreement on various green and environmental standards for shipping. SSI believes that a global compliance standard framework should be produced to improve transparency, simplify verification and enhance sustainability performance.

SSI has set a series of workstreams to achieve its vision; financing new technology, reducing the life-cycle impact of vessels, producing a standard of standards to drive improved sustainability performance and a step-change in energy technology innovation and uptake.

Shippers’ Decarbonisation Scheme

There is also scope for voluntary initiatives, for example in 2011, the UK Freight Transport Association (FTA) collaborated with Heriot-Watt University in Edinburgh to develop a broad range of measures to reduce the carbon intensity of supply chains containing a deep-sea movement, including focusing on port-centric logistics. Known as the Shippers’ Decarbonisation Scheme, the outputs from the project are intended to be definitive best-practice guidance on reducing cargo emissions in global maritime supply chains. The project is focused on the shipper rather than the shipowner and has the backing of the Global Shippers’ Forum and the Clean Cargo Working Group. Shippers are now under pressure to take responsibility for Scope 3 emissions. As part of the project, a report titled *A Supply Chain Perspective on the Decarbonisation of Deep-sea Container Movements* is to be published shortly. The report focuses on the role of the shipper rather than the shipping line to improve efficiency and presents 8 key parameters to show how the decisions made by shippers can decouple the volume of containerised trade from supply chain-related CO₂ emissions. An overall assessment is made of the extent to which shippers can influence the carbon footprint of deep-sea container supply chains.

**Key parameters**

- Choice of transport mode
- Choice of carrier and port
- Average handling factor
- Average length of haul
- Container utilisation
- Repositioning of empty containers
- Energy efficiency
Carbon intensity of energy used – out of shipper's control

Examples of decarbonisation options identified

- Switch to lower carbon transport modes for feeder services
- Switch to carriers with lower carbon-intensity values on feeder and deep-sea services
- Improve container loading both on export and import consignments
  - here is a lack of data on cube utilisation of container capacity
  - evidence suggests that inbound containers of retail supplies are >90 per cent full
  - increased per cent of 9'6 and 40' and 45' containers for greater load consolidation
  - main efficiency gain from improving internal packaging fill
- Reroute of containers to minimise CO$_2$ emissions from feeder services, deep-sea leg and port operations
  - reduce length of haul to/from port
  - choose ports with better rail and short-sea feeder links
  - adopt port centric Logistics strategy
- Reconfigure supply chains to exploit container backloading opportunities
  - greater triangulation potential on some routes

Voluntary schemes

In conjunction with the Shippers' Decarbonisation Scheme and other initiatives, it would be useful to discuss the merit of whether the global shipping industry can actually reduce its emissions via a voluntary approach. There are examples of voluntary schemes for freight transport such as the UK’s Logistics Carbon Reduction Scheme developed by FTA. It is a voluntary approach for recording, reporting and reducing carbon emissions from road freight transport. The impetus for the scheme has been to reassure Government that the freight industry is playing its part in the UK meeting its 2020 targets for carbon dioxide without the need for additional taxation or regulation. The scheme, originally started in January 2010, now has over 65 major participants and accounts for over 58,000 commercial vehicles.

Participants are asked to submit fuel data and other company details to FTA on a regular basis to ascertain the company's absolute carbon footprint from freight and emission trends over time. In April 2011, following the publication of the first LCRS annual report, the scheme received endorsement from the UK Government as a key way for road freight operators to record, report and reduce carbon emissions. This leads to the suggestion that industry bodies could develop a similar model to capture carbon reporting from shipping and use initiatives such as the Shippers’ Decarbonisation Scheme to encourage reductions.

Port initiatives

There are a number of initiatives being taken by ports to reduce greenhouse gas emissions from the sector such as the World Port Climate Initiative.

World Ports Climate Initiative

On April 16, 2008, the International Association of Ports and Harbors (IAPH) requested its Port Environment Committee, in consultation with regional port organisations, to provide a mechanism for assisting the ports to combat climate change. The C40 World Ports Climate Declaration was adopted in July 2008, as 55 ports from all over the world came together at the C40 World Ports Climate Conference in Rotterdam to commit to jointly reduce the threat of global climate change. The World Port Climate Initiative (WPCI) was formally launched at the symposium which was hosted by the Port of Los Angeles and the IAPH Port Environment Committee on 24 and 25 November, 2008, as a follow-up to the Rotterdam conference.

Through the WPCI, 55 of the world's key ports have committed to reducing their ghg emissions whilst continuing their role as transportation and economic centres. The ports commit to influencing the sustainability of supply chains, taking into account local circumstances and varying port management structures. They also cooperate with ships in support of measures to reduce emissions to air from ships.

One of the projects within WPCI is the development of a voluntary Environmental Ship Index (ESI). The ESI identifies seagoing ships that perform better in reducing air emissions than required by the current emission standards of
the International Maritime Organization, the Environmental Ship Index. The ESI evaluates the amount of nitrogen oxide (NOx), sulphur oxide (SOx) that is released by a ship and includes a reporting scheme on the greenhouse gas emission of the ship. The ESI represents an indication of the environmental performance of ocean-going vessels and will assist in identifying cleaner ships in a general way.

The index is intended to be used by ports to reward ships when they participate in the ESI and will promote clean ships, but can also be used by shippers and shipowners as their own promotional instrument. It should be noted that while ESI will provide a total score, the rewards can either be based on that total or on each of its constituent parts separately. The ESI is a flexible instrument which is expected to be adapted according to the developments within IMO, and will also take account of the priorities of ports in general with regard to the environmental performance of ships that ports wish to promote. This may mean that the weighing of the scores between the different constituents of the formula might change and that the evaluation of the performance can be adjusted to be more in line with experiences gained and technological developments. Additionally new constituents may be added and existing ones deleted; discussions with stakeholders that have an interest in ESI, form part of this process. Deletions will be made if a measure has proven to be effective and the behavioural change has become widespread. However, to maintain the score predictability and the program stability, changes will be few and never take place more than once a year.

Port of Los Angeles' Environmental Ship Index

Major shipping carriers Evergreen, Hamburg Sud North America, Hapag-Lloyd, Maersk Line, Nippon Yusen Kaisha and Yang Ming are the inaugural participants in the Port of Los Angeles’ Environmental Ship Index, an international clean air incentives program that rewards ocean carriers for bringing their newest and cleanest vessels to port. The Port of Los Angeles has committed $450,000 to jumpstart the voluntary program. Vessel operators will be rewarded for voluntary engine, fuel and technology enhancements that reduce emissions from ships beyond the regulatory environmental standards set by IMO.

Los Angeles is the first seaport in North America and the Pacific Rim to agree to a program based on the Environmental Ship Index, a web-based tool already used at 14 European ports and developed through the World Ports Climate Initiative. The port developed its ESI with input from the Pacific Merchant Shipping Association and other stakeholders. The Port of Los Angeles recently reported that its cumulative emissions have dropped as much as 76 per cent while container volumes increased 6 per cent between 2005 and 2011.

East Asia Climate Partnerships

The Republic of Korea has developed a climate change initiative known as East Asia Climate Partnerships which aims to support efforts to reduce carbon emissions and to move toward a low-carbon society. As part of the initiative, an agreement has been made between the Korea International Cooperation Agency (KOICA) and IMO for the implementation of a technical co-operation project on Building Capacities in East Asia countries to address greenhouse gas emissions from ships.

Further information is in Annex 8.
GSF summary conclusions on proposed MBMs

This briefing note’s analysis of the main MBMs currently being considered by the IMO to reduce greenhouse emissions from the maritime sector shows that there is a time consuming and complicated task ahead to effectively deliver a proposal that is acceptable to both developing and developed countries and shipowners and shippers alike. As MEPC 64 approves a further more detailed impact assessment of the proposals, the sector has been targeted as a financial source for the Green Climate Fund and Europe is pressing ahead with its own emissions monitoring system. Is there a deliverable MBM and when will it come into force?

Cost moved along the supply chain

The MBMs proposed such as the bunker levy and an emissions trading system direct costs straight back to the key player in the maritime industry, the shipper. Schemes which merely put charges on fuel will be simply pushed along the supply chain to the shipper and may provide little incentive for shipowners to actually improve efficiency.

The role of the shipper

Whilst the parties at the IMO debate the issues, industry is already driving forward improvements in efficiency from practical measures such as slow steaming to developing a methodology to accurately track greenhouse emissions. At the heart of these actions is the shipper. For instance, the Clean Cargo Working Group measures and reports the environmental impact of global goods transportation. There is appetite from shippers for precise information on carbon footprinting and to consider their corporate and social responsibilities. The mode in which their products travel and the impact on the environment is of high priority driven by customers and the climate change agenda. This culminates in changing the way that shippers will do business and influence how supply chains operate in the future. Such decisions will affect the configuration of global supply chains, and strategic decisions such as warehouse location and development of consolidation centres. In short, decisions taken on which MBM to adopt will have huge consequences for global supply chains well beyond ship operations.

Shipowners under pressure

This mentality will serve to influence shipping lines who need to compete not just on price but on environmental cost. Shippers can and are driving environmental improvement not only through collaboration, but through competition based on environmental performance. Shippers want to be able to choose the most efficient method of moving goods, which makes developing a single global methodology for calculating emissions from maritime transport critical. Given the shippers’ key role in driving carbon reduction, rather than simply placing the financial burden on them, they need to be part of the MBM solution. It is essential that shippers are involved in IMO’s process as any MBM that is introduced will not just impact the maritime sector but will have a much wider influence on the global supply chain.

Next steps

Whilst the IMO should receive credit for its adoption of the EEDI and SEEMP to make the industry greener, it is now time to bring shippers to the table to create an MBM that is a single global solution. The process is currently slow and the threat of national and regional schemes will just add complexity, cost and compliance difficulties. The EU’s step to develop its own emissions monitoring system is understandable given its own climate change reduction targets, but Europe should still work with the IMO to ultimately deliver a global MBM. The European Commission stance on aviation has proved to be divisive and it could be replicated again in the maritime sector. A number of proposals such as the EIS and SECT utilise efficiency standards as the basis for MBM and make carbon emissions reductions draw attention to the merit of adopting schemes that focus on improving efficiency. These bear comparison with a number of schemes developed by shippers and carriers to capture carbon reductions from the shipping sector.

Consequently, the principles on page 27 highlight GSF’s belief that an MBM, mandatory or voluntary, should focus on operational efficiency, be transparent and above all be global in approach.
In formulating its position ahead, and in exploring opportunities for collaboration with the shipping industry and other stakeholder interests, the Global Shippers’ Forum (GSF) has established the following principles.

- Transparency of carbon emissions and interventions is essential so that shippers can identify their maritime supply chain carbon footprint in order to meet shippers’ Scope 3 obligations under the GHG protocol.

- For any scheme to be acceptable to shippers it should target operational efficiency, focusing on the efficient management of fuel and fuel costs, and lowest carbon cost per unit moved.

- The measurement and recording of fuel usage and activity is an essential first step in delivering low cost and best value solutions, rather than emission reductions at any cost. It is also a prerequisite for any future cap-and-trade scheme.

- The shipping industry must take direct responsibility for setting and delivering a clear target for reducing carbon emissions.

- The potential development of voluntary shipping industry initiatives to reduce carbon emissions.
# At a glance overview of MBM proposals submitted to the IMO

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<tr>
<td>International GHG Fund</td>
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<td>✅ above an agreed target</td>
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<td>EIS</td>
<td>✗</td>
<td>✅ on failure to meet standards</td>
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<td>SECT</td>
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<tr>
<td>Alternative to an MBM</td>
<td>✗</td>
<td>✗</td>
<td>✅ possibly if standards are not met</td>
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<td>Port-based levy</td>
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### Overview of MBM proposals submitted to the IMO

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<tr>
<th>Scheme</th>
<th>Aims</th>
<th>Impact on shippers</th>
<th>Impact on ship operators</th>
<th>Impact on GHG emissions</th>
<th>Possible pros</th>
<th>Possible cons</th>
<th>Supporters</th>
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<tbody>
<tr>
<td>International GHG contribution fund</td>
<td>A contribution fund-based approach to reducing fuel consumption and GHG emissions</td>
<td>Costs passed on to the shipper</td>
<td>Ship owners are charged a levy for each tonne of bunker fuel consumed if they exceed the agreed reduction target</td>
<td>Costs of scheme are simply redistributed along the supply chain</td>
<td>• Straightforward approach to reducing fuel consumption and GHG emissions</td>
<td>• Cost of scheme is simply redistributed along the supply chain</td>
<td>Cyprus, Denmark, the Marshall Islands, Nigeria and the International Tankers Association</td>
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<tr>
<td>International Chamber of Shipping</td>
<td>An emissions trading system to achieve a long lasting reduction in CO₂ emissions administered by the IMO</td>
<td>Cost of carbon allowances passed on to shippers</td>
<td>Forces ship operators to become more efficient in order to minimise the amount of carbon allowances that need to be purchased</td>
<td>Market-based instrument to force industry to reduce emissions</td>
<td>• Encourages and rewards efficiency improvements</td>
<td>• Too much reliance on offsetting emissions</td>
<td>France, Germany, Norway and UK</td>
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| Efficiency Incentive Scheme | To achieve carbon emission reductions by encouraging improvements in the energy efficiency of ships | Following new proposals by Japan, flat rate fees for missing EEDI standards could be passed on to the shipper | Ships meeting specified (EEDI) standards would not be subject to any fees, penalties or costs other than costs associated with the design and installation of more efficient ship technologies | Ghg emissions are reduced by making technical improvements within the shipping fleet | • EEDI used as model  
• Will stimulate significant improvements in carbon efficiency of fleets  
• Avoids development of regional carbon schemes  
• Avoids limiting trade | • Improvements in the design and installation of technologies may not be significant enough to make cuts in ghg from shipping  
• EEDI cannot be applied accurately to existing ships  
• Introduction of fee-based system for existing ships | World Shipping Council and Japan in a joint proposal to IMO  
(Japan submitted separate follow-up proposals in 2012) |
| SECT | An efficiency standards scheme whereby shipowners earn credits for exceeding standards and those who do not meet the standard are required to purchase credits. This is in accordance with the ship's activity level | None identified | The focus is placed on energy efficiency standards and improving the design and efficiency of ships | Ghg emissions are reduced by making technical improvements within the shipping fleet | • EEDI used as model  
• Maximises in-sector efficiency improvements  
• Does not attempt to cap net emissions  
• Encourages and rewards efficiency improvements | • Credits do not represent CO₂ emissions  
• Scheme will not make the deep emission cuts required by the sector  
• Time consuming and administrative burden to assess every ship's efficiency level | United States in a proposal to IMO |
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<tr>
<td>Alternative to an MBM</td>
<td>Reducing ghg emissions from ships through port state institutional arrangements</td>
<td>The focus is placed on the design and efficiency of ships</td>
<td>Cost passed on to the shipper if reduction targets are not met</td>
<td>Ggh emissions are reduced by making technical improvements within the shipping fleet</td>
<td>• Does not set a cap on emissions</td>
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<td>Bahamas in a proposal to IMO</td>
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<td>• Avoids distorting the market</td>
<td>• Targets the vessels directly</td>
<td>Jamaica in a proposal submitted to the IMO</td>
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<td>• Encourages efficiency improvements</td>
<td>• Reductions required will be based upon a ship’s actual operational emissions</td>
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<td>• No restriction on how shipowners make their ships more fuel efficient</td>
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<td>• Increased administration and bureaucracy</td>
<td>• No restriction on how shipowners make their ships more fuel efficient</td>
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<td></td>
<td>• No central control of system</td>
<td>• Little incentive for shipowner to make efficiencies</td>
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<td>• Could distort the market</td>
<td>• Developed countries will bear the most burden</td>
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<td>• Cost passed onto shippers</td>
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<td>• Little incentive for shipowner to make efficiencies</td>
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The US proposes to address greenhouse gas (ghg) emissions from international shipping through efficiency index standards and allowing trading of efficiency credits as one way for ships to meet these standards. Increased efficiency would reduce fuel consumption and ghg emissions and provide financial rewards to efficient shipowners and operators. The US put forward a Ship Efficiency Credit Trading Scheme (SECTS) to complement the IMO's EEDI for new ships at MEPC63. Under SECT, all ships, including the existing fleet, would be subject to mandatory energy efficiency standards, rather than a cap on emissions or a surcharge on fuel. Ships operating more efficiently than required would earn efficiency credits based on current ship efficiency rate and activity. Ships operating less efficiently than required would have the option of purchasing efficiency credits from more efficient ships, as one method of achieving compliance with the efficiency standards. A highly efficient ship will continue to generate efficiency credits for several years, and the value of the future stream of credits can be factored into the price of a ship should the owner decide to sell it.

The impacts on trade are expected to be minimal as there is no cap on growth of the sector and in many cases the overall transport cost would decline due to decreased fuel costs. As such, the impact on LDCs and SIDS is also expected to be minimal. The costs of the scheme are directed at technology improvements, which are then expected to result in cost savings due to lower fuel consumption. The US proposes that only ships of 400 GT and above would be included in the scheme. Analysis of the proposed SECT with data from the IMO’s second ghg study indicated that the scheme could reduce ghg emissions by 10 to 30 per cent by 2020.

For MEPC 64, the US has revised its proposal recognising the merit in establishing energy efficiency standards based on total fuel consumption, thereby capturing all operational and technical measures that a ship might utilise. This would establish a comprehensive indicator of a vessel’s efficiency. The US recommends a three phase approach to introducing such standards to foster improvements in energy efficiency for both new and existing ships.

1. Phase 1 – Data collection phase
   - Each ship above 2,000 gross tonnes and engaged in international voyages would be obligated to report the following data annually:
     1. Quantity and types of fuel consumed – quantity of all fuel oil, liquefied petroleum gas (LPG), and liquefied natural gas (LNG) consumed by a ship, whether at sea or in port, during the reporting period
     2. Distance sailed – total distance sailed in nautical miles during the reporting period
     3. The cargo mass carried or work done per tonne mile – based on guidelines developed by the IMO
   - In addition, information on the sea states, wind, water density and currents should also be considered – these factors may have a negligible impact but relevant data will help determine whether or how to take these factors into account

   Ships covered by the requirement would be obligated to conduct a test of its attained technical efficiency during phase 1 and report the results to its administration. Taking into account guidelines to be developed by IMO, the test would require each ship to sail for a period of 6-12 hours, under fair weather and with calm sea states, at 75 per cent maximum continuous rating (MCR), and at 70 per cent deadweight tonnage (DWT) for container ships or 100 per cent DWT for all other vessel types. The ship would be required to report the elapsed time, percentage of DWT, percentage of MCR, distance travelled, fuel consumed (including types and quantities), and wind and weather.
conditions during the test. Results would be collected during normal operations.

Based on the information provided to the administration, the value for the attained overall efficiency for each ship would be calculated by:

\[
\text{Attained Overall Efficiency} = \frac{\text{CO}_2 \text{ emitted from fuel consumed during the period}}{\text{Cargo carried or work done during the period}}
\]

Administrations would issue an international attained energy efficiency (IAEE) certificate to each ship certifying compliance with the reporting requirement. They would also submit data collected to the IMO.

Phase 2 – Pilot phase

The pilot phase would conduct a ‘test run’ of the energy efficiency regulations. This would also allow the IMO to evaluate the regulations in use and make adjustments to them as necessary, before attainment of the standards becomes mandatory. Additionally, the pilot phase would allow time for ships to meet standards before they become mandatory.

Phase 3 – Full implementation phase

In phase 3, the attained efficiency standard would be mandated and ratings allocated to ships.

Alternative to MBMs – the Bahamas

The Bahamas believes that the only means by which ghg emissions from ships can be directly cut is through operational and technical means, rather than introducing administrative burden and bureaucracy with an MBM. It supports the IMO’s second ghg study, which stated that operational and technical measures could reduce ghg emissions by 25 to 75 per cent. The proposal aims to produce a direct measurable reduction in ghg emissions from ships without increasing the cost of trade. It builds on earlier IMO initiatives to control emissions of nitrogen oxides (NOx) and sulphur oxide (SOx) from ships under MARPOL Annex VI. The international community would be set a phased mandatory reduction target to be met by all ships according to age as shown in the following table.

The reduction in CO\(_2\) emissions would be based upon a ship’s actual operational emissions collected over a three year period. Reductions could then be achieved through a combination of design measures, technical solutions, carbon capture techniques, operational measures or, if reductions are not achievable, through a mechanism to be developed by the IMO. Since designers, engineers and owners have all demonstrated how immediate cuts of well above 20 per cent can be achieved without enormous effort or expenditure, a mandatory reduction of 20 per cent for existing ships should be achievable. In addition, as new ships can be designed with many emission reduction measures incorporated, a higher reduction level of 25 per cent could be achieved. A phased implementation has been suggested due to the difference in capital investment/depreciation between a 5 year old ship and a 20 year old ship and the long lead-time in purchasing. A dispensation could be offered for vessels with only a short period left prior to scrapping (less than 4 years).

The proposal would be implemented in four stages. New ships (vessels with an EEDI) should not have to comply with the reduction target until they are 5 years old.

In preparation for the MEPC, the Bahamas proposed that a study be conducted to decide the most reliable and replicable method. The primary source of data would be the bunker delivery notes and, using three years of records, the average CO\(_2\) emission level will be calculated for each individual ship. For the data collection period, there would be a two-year voluntary implementation period.
during which the owner would implement the required emissions cut. This voluntary two-year period would allow time for industry to adjust to the new regime and highlight problems and issues. With a further three years to meet a voluntary baseline, the owner of an existing fleet would then have to comply with the required reduction from the ship specific rolling average baseline figure (generated in the data collection period). Monitoring and control would be undertaken through the normal flag and port state inspection regime. In the event that a ship could not meet the requirements of the reduction, the owner would have two options; either compliance through a mechanism developed by IMO or for the following year to reduce the emissions by that additional amount.

Critics of the scheme say that although it encourages efficiency improvements and does not distort the market, it relies too heavily on the expected high price of oil to provide the incentive to reduce emissions.

At MEPC 63, the committee agreed that the Bahamas' proposal will be subject to the impact assessment but it should also be part of a separate workstream to investigate further mandatory reductions by technical and operational measures either as an alternative to an MBM or as an interim solution.

ICS opposes the Bahamas' proposal as if a ship's CO₂ allowance was exceeded during the time period specified, it would have to go off-hire and a second ship chartered as a replacement. This would be further compounded by the potential variation of fuel consumption of two identical ships due to trading patterns and weather. ICS labels the proposal 'fuel rationing which would be highly damaging to large parts of the industry.'

Reducing greenhouse gas emissions from ships through port state institutional arrangements - Jamaica

Jamaica's proposal aims to directly reduce CO₂ emissions from the maritime sector with no regard to the design, operation or energy source of ships. The concept is to levy a uniform emissions charge (port based levy) on all vessels calling at their respective ports. The process would be enforced by the port state by way of the respective port authorities. The proposal targets the ship itself irrespective of the owner, operator or charterer. The charge will be based on the amount of fuel consumed by the respective vessel on its voyage to that port rather than via bunker supplies. The proposals rely on the operational practice of fuel being routinely monitored and recorded. For example, larger vessels have fuel flow meters that can record fuel consumption with an accuracy of ±0.2 per cent, with other vessels relying on sounding tanks with a lower level of accuracy. An appropriate carbon conversion factor would be applied to calculate the emissions and subsequent charge. Jamaica considers that as most world trade is taking place between developed countries, they will bear the cost in direct proportion to their emissions rather than developing countries. Voyage models such as the Ship Traffic Energy and Emission Model (STEEM), developed at the University of Delaware, could audit fuel consumption and efficiency improvements declared by vessels and further support EEDI. Other models such as SeaKlim may also be used.

Jamaica argues that a price attached to a tonne of carbon is a more desirable scheme rather than setting a quantity target, as each time a vessel emits CO₂, there will be a financial cost attached to it. However, others believe that developed countries will bear the most burden and with no central control of the system there will be increased administration and bureaucracy. The levy may also be impractical for certain administrations to implement. A prototype of the STEEM concept in a port state environment could be developed to demonstrate the scheme's ease of use and universality.

A rebate mechanism for developing countries

In addition to the above proposals, the International Union for Conservation of Nature (IUCN) has proposed a rebate mechanism to compensate developing countries for the financial impact of an MBM, such as a levy or cap and trade scheme. The IUCN believes that any MBM should adhere to the principles of UNFCCC that developing countries (who have either not industrialised or not industrialised to the extent of developed countries) should not be expected to commit to the same level of climate change reduction as developed countries. This is known as the principle of common but differentiated responsibilities and respective capabilities (CBDRC). However, by the same token, at numerous MEPC meetings, delegations have expressed the importance of any MBM being applicable to
all ships irrespective of flag to avoid competitive distortions. Therefore the IUCN proposes that developing countries receive a rebate against their participation in an MBM. As a country’s usage of international shipping is closely related to its imports, IUCN recommends the use of global imports data to calculate a country’s usage of international shipping and therefore also estimate a country’s share of costs of applying a global MBM. For instance, the UK imports approximately 5 per cent of goods worldwide and therefore could account for 5 per cent of international maritime emissions. By comparison, all African countries together import less than 3 per cent of goods worldwide. Each developing country would obtain annual rebates for climate change action with funds available for technological advances within the shipping industry. The amount of rebate would be calculated annually, in proportion to a key based on a country’s share of global imports by value.

The rebate mechanism has been integrated with the International Maritime Emission Reduction Scheme (IMERS) as a pilot. Under the IMERS, a market-driven levy is established on fuel bunker, as an alternative for a levy on ghg emissions. The levy would apply to all ships over a predetermined size, engaged in international maritime transport, irrespective of their flag and nationality of the shipowner. In order to deliver proportionality of the shipping effort to combat climate change, the levy is linked to a prevailing fee on land transport emissions, or to the rolling average market carbon price, as available. Fuel bunker, in a given quarter, must be electronically reported and is subject to payment of the levy. To reduce the burden on the shipping industry and guarantee a quick deployment, the system is based on a central emissions registry (ER) holding an emission account for each ship, and a predetermined global bank or banks, providing a payment account for each ship.
Annex 4
Germany – an impact assessment of an ETS with a particular view on developing countries

In 2010, Germany provided further information on ETS and commissioned CE Delft, supported by Fearnley Consultants and the Institute of Atmospheric Physics of the German Aerospace Centre, to further develop a worldwide emissions trading system and to analyse the impacts of such a scheme with particular consideration for developing countries.

The study’s conclusions included the following.

- The size of the impact on the shipping sector depends on vessel type and size, fuel price, allowance price and the proportion of allowances auctioned.

- Assuming a fuel price of $15 per tonne of CO₂ the cost increase for 6 different vessel types ranges from 4 to 8 per cent of total operating costs. In summary, the costs of allowances would constitute a small fraction of total vessel operating costs.

- Disaggregating cargo types found that the value of imports of crude oil and manufactured products is least affected, increasing by less than 1 per cent. Ores and coals are most effected and their import value could increase by a little under 3 per cent.

- Some positive economic aspects would result for ship builders, the engine manufacturers and classification societies due to a stimulation for demand of emission reduction technologies.

- A major share of the cost increase can be passed on to consumers, therefore the impact on import values in different groups of countries and regions was calculated using a very detailed worldwide calculation of shipping emissions based on the Lloyds MUI database.

- The study showed and concluded that the impact of a maritime ETS on the shipping sector and on different regions and countries is low.

- In order to consider the particular situation of developing countries the study further developed options to compensate for them. Some ways, such as exempting certain routes, ship types, ship sizes and cargo types would distort markets and potentially lead to higher emissions. The preferable option would be to use parts of the revenues and to re-distribute them to developing countries in order to mitigate undesired impacts.
The Third Intersessional Meeting of the Working Group on greenhouse gas emissions from ships took place from 28 March to 1 April 2011 held under the chairmanship of Cyprus. More than 200 representatives from member governments and observer organisations participated in the meeting. The meeting, held a few months before the IMO’s agreement to the EEDI and SEEMP, highlighted the views of other countries (that have not submitted proposals) of MBMs. The working group concurred with the urgent need for global reductions in greenhouse gas emissions to support the target of limiting global temperature rise to 2°C, as agreed at Cancun, Mexico in December 2010. The working group was instructed to examine and provide the group’s opinion on the compelling need and purpose of MBMs to reduce greenhouse gas emissions from international shipping which would then be submitted to MEPC 62. A selection of viewpoints from countries are provided below.

From the debate at the working group, two groups of opinion came to the forefront. One group considered that a compelling need for an MBM under IMO had been clearly demonstrated such as providing a further incentive to reduce emissions against technical and operational measures and the need to act now to avoid costly implementation in the future. The other group considered that a compelling need for an MBM for international shipping under IMO had not been clearly demonstrated due to reasons such as current MBM proposals failing to identify and quantify the impact of MBMs on international trade and food prices. A range of arguments for and against MBMs are shown below.

A selection of viewpoints in favour of an MBM included the following.

1. Climate change is a significant global challenge that will impact all states without differentiation; as the international maritime transport sector contributes to this impact, it should take part in the global mitigation efforts.

2. There is a need to supplement emission reductions, from technical and operational measures, with an MBM and to provide additional options through offsetting.

3. A delay in the introduction of an MBM for international shipping will lead to more costly implementation in the future.

4. An MBM would deliver the most cost effective solution to reduce emissions and encourage investment in low-carbon technologies.

5. Universal application of an MBM would provide a robust emission reduction mechanism for the industry and avoid market distortions. Differentiating MBMs by flag, country of ownership or by final destination would undermine the effectiveness through carbon leakage (eg by reflagging) and market distortions.

6. With global energy prices expected to continue to rise, including bunker fuels, an MBM would incentivise investment in energy efficiency and produce significant benefits through lower operating costs and savings, and is supported by the shipping industry organisations.

7. An appropriately designed compensation mechanism for the MBM could compensate developing countries for adverse impacts, with close attention and assistance to the needs of the LDCs and the SIDS given their special vulnerability; this would give full effect to the UNFCCC principle of common but differentiated responsibilities.

8. A universally applied and uniformly regulated international MBM would avoid trade distortions and be fully compatible with the rules and objectives of the World Trade Organization.

Opinions of those generally opposed to an MBM, included the following comments.

1. IMO does not have a mandate to develop an MBM for greenhouse gas emission reductions, that mandate falls under UNFCCC.

2. The MBM proposals do not incorporate the UNFCCC principles and so would not allocate responsibility adequately and reflect historical emissions.

3. Developing countries are reducing their greenhouse gas emissions in accordance with their nationally appropriate mitigation actions. At UNFCCC, the reduction in greenhouse gas emissions is still being discussed. In such a scenario, IMO should await the outcome of relevant decisions at UNFCCC to ensure that the international shipping industry does not become uncompetitive.
4 MBMs would increase the cost of operating ships and this cost would be absorbed, in varying degree, within ship operating costs and freight costs depending on market conditions. Developing countries export mostly low value raw material, on which the impact of increased transportation costs would be much more noticeable, thereby putting these countries and their exporters at a disadvantage.

5 Insufficient studies exist for the MBM proposals to identify and quantify the impact of MBMs on:

   a) sustainable development of international shipping
   b) international trade, economy and development of developing countries, particularly on SIDS and LDCs
   c) food price and food security, especially in the context of developing countries’ struggle to eradicate hunger
   d) import and export of commodities, especially at significant distance from the source and destination
   e) small and medium sized exporters in developing countries

6 Developing countries would bear a disproportionate burden of the environmental and socio-economic cost of the high GHG emitting lifestyles found in developed countries.

7 All MBMs require use of technologies and practices for fuel efficiency enhancement and, inherently, developing countries would be adversely affected due to their lack of access to necessary finance and technology to implement such changes.

8 Unlike MBMs, technical and operational measures under development in IMO, which would not adversely impact, directly or indirectly, on developing countries, could be sufficient in substantially reducing GHG emissions from the shipping sector and thus the shortfall to be addressed by an MBM has no basis.

9 An MBM for international shipping under IMO would be incompatible with WTO rules.

The working group paper was submitted to the MEPC for further discussion, but little progress has been made. Despite the development of 7 proposals, there are still a wide range of countries that do not accept that IMO has the mandate to introduce an MBM, making agreement on tackling shipping’s emissions even more contentious. Those that have not submitted an MBM still raised views at the working group. For example, China, Brazil and India are opting for an MBM that is not imposed on developing countries. They consider that the burden of reduction should be based on respective historical responsibility and capability. They fear that any MBM would impact on world trade and developing countries. Those who export low value goods, and need to deliver internationally in order to trade, will be unfairly disadvantaged (see Annex 10 for India’s proposed viewpoints to the MEPC). Meanwhile, Australia which is geographically isolated and from where 95 per cent of its exports are transported by sea, is likely to be most affected by an MBM. Australia rejects the common but differentiated responsibility to the design of an MBM as shipping operators would simply change their country of registration or refuel in countries exempted. A compensation mechanism for developing countries is recommended. The Russian Federation submitted a paper to MEPC stating that MBMs will only be appropriate when all parties have approximately similar level of economic development, structure and age of ships in operations. They reject argument that this would lead to flag discrimination.
The MEPC at its 63rd session decided to undertake a further impact assessment of proposed MBMs for international shipping as a follow-up to the work undertaken by the Expert Group on Feasibility Study and Impact Assessment of possible MBMs which reported to MEPC 61 as well as to the subsequent examination of the report of the MBM-EG by the Third Intersessional Meeting of the Greenhouse Gas Working Group.

The impact assessment will set out possible socio-economic impacts, both positive and negative, on developing countries, in general, and less developed countries and small islands developing states and remotely located developing countries with large trading distances, in particular, as well as on their consumers and industries, of introducing an MBM for international shipping under IMO.

The assessment will address both potential positive and negative impacts up to year 2050, assuming that the measures are in force by 2017, and with detailed analyses for the years 2020 and 2030. It will also analyse the impacts and costs for the global community associated with no further regulatory action for international shipping in addition to the EEDI and SEEMP.

The following proposals will be assessed.

### 2011 proposals

- **An international fund for greenhouse Gas emissions from ships** – Cyprus, Denmark, the Marshall Islands, Nigeria, IPTA and Republic of Korea
- **A global ETS for international shipping** – France, Germany, Norway and the UK
- **Efficiency Incentive Scheme (EIS) – Japan and WSC**
- **Ship Efficiency Credit Trading with Efficiency Standards (SECT) – United States**
- **Alternatives to market-based measures – the Bahamas**
- **Reducing greenhouse gas emissions from ships through port state institutional arrangements – Jamaica**
- **Rebate mechanism**

### Methodology

The Impact Assessment should always be guided by IMO's rules and practices as well as the general principle of equity and be carried out taking into account the following terms of reference.

1. The scope of the impact assessment is to review the effectiveness and distribution of impacts of implementing the various options for an MBM that have been proposed to the committee.

2. The assessment shall aim to identify, for each analysed MBM, the reduction potential on ghg emissions from international shipping; its impact on world trade (impact on overall world trade levels with special focus on trade and economy of developing countries and potential impacts on trade routes or distribution of trade) and the shipping industry; and the maritime sector, in general, giving priority to the maritime sectors in developing countries.

3. The assessment should be conducted by selected institutes/consultants, following IMO's Procurement Procedures under the direction of the Secretary-General, with appropriate expertise and experience on matters within the scope of the assessment and should, preferably, be undertaken by an international consortium, or consortia, with one of the institutes/consultants serving as the co-ordinator providing a project leader.

4. The Steering Committee should, due to possible budget and time-constraint issues, decide at its first meeting on possible division of the assessment into different modules and may decide to address the modules by different work methods.

5. The Steering Committee may agree on further elaboration of the criteria within the terms of reference, and may decide to utilise one or multiple consultants to undertake the analysis of all or some elements of the proposals.

6. While taking into account relevant new information, the selected institutes/consultants should not duplicate existing studies that have already been undertaken. Therefore, in conducting the assessment, the selected institutes/consultants may consult a broad range of reputable organisations, institutions and resources with relevant experience and/or expertise within areas of the terms of reference. Authors should validate the credibility of the information obtained. The responsibility for the content of the impact assessment study would rest with the selected institutes/consultants.
The outcome of the assessment should provide clear and robust conclusions and factual information. The end-result should aim at assisting the committee to make well-informed decisions and should not make specific recommendations on policy issues.

**Criteria**

Following the methodology used by the MBM-EG and taking into account its findings and recommendations, giving priority to the possible impacts on consumers and industries in developing countries, the assessment should, for each of the MBM proposals, assess:

1. the environmental effectiveness, eg whether and to what extent the proposed MBMs are sufficiently effective in limiting and reducing greenhouse gas emissions from international shipping

2. the cost-effectiveness of the proposed MBMs and their direct or indirect impacts on ship operation, trade, including trade between developing countries, consumers and industries, and the possible effects on the competitiveness, and the possible distortions in trade, with focus on developing countries, particularly on LDCs and SIDS and remotely located developing countries with long trading distances

3. the socio-economic cost-effectiveness of the proposed MBM and its potential impact(s) on trade and sustainable development, and the possible direct and indirect impacts on the following:
   a. energy and fuel price
   b. marine fuels and alternative fuels, particularly the research and use of sustainable biofuels
   c. food price, including food imports by developing countries, in particular LDCs, SIDS and remotely located developing countries with large trading distances
   d. shipping industries, in particular in developing countries
   e. consumers, in particular in developing countries
   f. the price of raw materials and commodities
China believes that the assessment of proposals of MBMs should assess whether an MBM proposal conforms to UNFCCC and other relevant conventions, and also assess the degree of its consistency and compatibility with the principle of CBDR.

In pursuing an MBM, China asserts that it is necessary to measure the financial costs for developing countries to ensure that they will not have a financial burden imposed.

Successful implementation and enforcement of measures to reduce GHG emissions from international shipping depends to a large extent on technology and capability of the maritime sector of developing countries, which would need to rely on technology transfer and capacity-building supported by developed countries. Therefore a comprehensive assessment should be conducted to assess the need of developing countries for technology and capacity-building.
Under the agreement approximately US$700,000 was made available by KOICA, which will fund 10 activities to be implemented by IMO over a two-year period. Projects to date include the development of a set of training materials and workshops that will assist the capacity-building objectives of the project in the long-term.

This sub-regional workshop was aimed at raising awareness of the work that IMO has been undertaking to address ghg emissions for shipping and included key elements such as IMO’s work with a focus on MARPOL and specifically MARPOL Annex VI; implementation and ratification – roles and responsibilities of administrations; a comprehensive overview of the ghg issue and the role of international shipping; explanation of the technical and operational measures for reducing ghg emissions from shipping including an overview of the specific technical and operational measures that can be used to reduce emissions and the cost effectiveness of those measures; and identification of what needs to be done to provide support for implementation including further capacity-building activities.
MEPC 63 considered possible use of revenues from an MBM for international shipping under IMO and its relation with the wider efforts in the world community to mobilise climate finance for use in developing countries. The committee considered also whether disbursement of revenue was a way to accommodate the principles agreed by the world community in combating climate change under UNFCCC and the IMO principles of non-discrimination. It was, in particular, noted that:

1 divergent views were expressed on use of revenues and the relation between an IMO MBM and climate finance, with a number of delegations advocating disbursement of revenues as a way to accommodate (reconcile) both CBDR and the IMO principles, while others opposed this if applied universally to all ships, and advocated an approach that would ensure no net incidence on developing countries.

2 a large number of delegations expressed the view that the greater part of any MBM revenues should be used for climate finance in developing countries.

3 the proportionality of shipping’s ghg emissions against the world’s total (eg 2.7 per cent) should be observed in the event that international shipping is used as a funding source for climate change actions in developing countries, and that double ‘taxation’ should be avoided (contribution under UNFCCC and contribution under IMO).

4 ongoing work in other forums such as UNFCCC and G-20 should be taken note of.

5 GHG-WG 3 had noted that there were several possible uses for revenues generated by an MBM for international shipping, as identified in the MBM proposals, including:

a incentivising shipping to achieve improved energy efficiency
b offsetting – purchase of approved emission reduction credits
c providing a rebate to developing countries
d financing adaptation and mitigation activities in developing countries
e financing improvement of maritime transport infrastructure in developing countries (eg Africa)
f supporting R&D to improve energy efficiency of international shipping
g supporting the Organization’s Integrated Technical Cooperation Programme

6 an MBM for international shipping under IMO should not be used as a source for general climate finance in the context of the Green Climate Fund where funding should be provided by developed countries.

7 the RM is an innovative and constructive proposal that addresses the CBDR principle and should be analysed and considered further.

The committee noted the ongoing work under UNFCCC on climate finance, in which international shipping had been listed as one possible source of finance, and also noted the AGF report (MEPC 62/INF.2 (Secretariat)) and the G-20 report (MEPC 63/5/7 by France) on mobilising funding sources for the Green Climate Fund (GCF).

The Republic of Korea made a statement expressing that revenues mobilised by an MBM from international shipping under IMO would be included in the GCF of the UNFCCC.

The committee agreed that the debate on climate finance and possible use of MBM revenues should be considered further at its next session (MEPC 64). It agreed to invite member states and observers to submit further input to the debate.

Source: MEPC 63/WP.1/Add.1
In MEPC 61/5/19 India believes there should be no mandatory requirement on developing countries for reducing greenhouse gas emissions due to their need to pursue social and economic development. Forty per cent of India’s population still lives without electricity and the efforts to remedy this will increase energy use and thus emissions. India asserts that the country already has two national market based measures to curb greenhouse gas emissions.

- Carbon tax on coal to fund clean energy
- Perform, Achieve & Trade (PAT) mechanism for energy efficiency of fossil fuels

India’s assessment of reducing greenhouse gas emissions notes that the emission intensity of the country’s GDP declined by more than 30 per cent during the period 1994-2007 and could potentially reduce to 20-25 per cent between 2005 and 2020.

Prior to the adoption of EEDI and SEMMP, India supported IMO’s work but believed it should be applied on the principle of ‘common but differentiated responsibility’ and not be imposed mandatorily on non-Annex 1 countries.

India has been concerned about the introduction of an MBM which would disadvantage developing countries. India has therefore undertaken a study on the possible impacts of MBMs on India’s shipping sector and trade. Ninety five per cent of the country’s trade by volume moves by sea. More than 50 per cent of the Indian fleet is over 20 years old and the average age of the fleet is 17 years. India believes that MBMs could impact on freight rates, the export/import prices of essential commodities due to bunker fuel rising costs, place burden on end consumers and possibly even increase the country’s ghg emissions. The study analysed the impact on capeside iron exports from India to China, imports of coal to India from Australia and imports of crude oil to India from Saudi Arabia. The study establishes that freight rates would rise.

### Possible Impacts of MBMs on India’s Shipping Sector and Trade

<table>
<thead>
<tr>
<th>Commodity</th>
<th>Change in Bunker Fuel Prices</th>
<th>Corresponding Change in Freight Rates</th>
</tr>
</thead>
<tbody>
<tr>
<td>Iron ore</td>
<td>+10%</td>
<td>+13.3%</td>
</tr>
<tr>
<td>Coal</td>
<td>+10%</td>
<td>+15.4%</td>
</tr>
<tr>
<td>Crude oil</td>
<td>+10%</td>
<td>+6.4%</td>
</tr>
</tbody>
</table>

India concludes that trade would be adversely impacted, there would be an inequitable burden on Indian consumers, which is against the CBDR principle, and consumers may therefore resort to poor quality high ash content coal leading to more ghg emissions.
Amongst the key findings, the report entitled *Estimated CO₂ emissions reduction from introduction of mandatory technical and operational energy efficiency measures for ships* – Zabi Baari, Lloyd’s Register, London, UK and Tore Longva, DNV, Oslo, Norway 31 October 2011 found that:

- by 2020, an average of 151.5 million tonnes of annual CO₂ reductions are estimated from the introduction of the EEDI for new ships and the SEEMP for all ships in operation, a figure that by 2030, will increase to an average of 330 million tonnes annually compared with Business as Usual (BAU), the average annual reductions in CO₂ emissions and fuel consumed are estimated between 13 per cent and 23 per cent by 2020 and 2030 respectively

- CO₂ reduction measures will result in a significant reduction in fuel consumption, leading to a significant saving in fuel costs to the shipping industry, although these savings require deeper investments in more efficient ships and more sophisticated technologies, as well as new practices

- significant reduction of CO₂ emissions from ships due to EEDI and SEEMP regulations is foreseen to 2050 with emission reduction due to SEEMP likely to be realised more rapidly than that for EEDI, as the effect of EEDI will occur only as and when older, less efficient tonnage is replaced by new, more efficient tonnage

- the estimated reductions in CO₂ emissions, for combined EEDI and SEEMP, from the world fleet translate into a significant annual fuel cost saving of about US$50 billion in 2020 and about US$200 billion by 2030; using fuel price increase scenarios that take into account the switch to low-sulphur fuel in 2020

- mandatory application of EEDI will drive more energy-efficient ship design and realise the CO₂ emission reduction potential associated with technical innovation and the use of lower or no carbon fuels

- The mandatory use of SEEMP based on current IMO regulations will provide a procedural framework for shipping companies to recognise the importance of the operational energy-saving activities. It will significantly boost the level of awareness and, if implemented properly, will lead to a positive cultural change

- investigations show that ship hydrodynamic and main engine optimisation will bring about energy-saving opportunities of up to around 10 per cent with no significant additional cost of shipbuilding

The IMO regulations represent the first-ever mandatory energy efficiency measures for an international transport sector and their adoption followed several years of work on the matter. Work is now progressing on market-based measures, with intensive work to review a number of different proposals, submitted by governments and observer organisations.

Further work will be carried out on market-based measures in 2012. Such measures would place a price on greenhouse gas emissions, thereby providing both an economic incentive for the maritime industry to invest in more fuel-efficient ships and technologies and to operate ships in a more energy-efficient manner and a mechanism to offset growing ship emissions in other sectors. In addition, these measures can generate funds that could be used, for example, for projects to mitigate climate change in developing countries.

Source: IMO press briefing 57 14 Nov 2011
<table>
<thead>
<tr>
<th>Abbreviation</th>
<th>Description</th>
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<tbody>
<tr>
<td>CCWG</td>
<td>Clean Cargo Working Group</td>
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<td>CSC</td>
<td>Clean Shipping Coalition</td>
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<tr>
<td>EEDI</td>
<td>Energy Efficiency Design Index</td>
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<tr>
<td>EEOI</td>
<td>Energy Efficiency Operational Indicators</td>
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<tr>
<td>EIS</td>
<td>Efficiency Incentive Scheme</td>
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<tr>
<td>ETS</td>
<td>Emissions Trading System</td>
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<tr>
<td>FTA</td>
<td>Freight Transport Association (UK)</td>
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<tr>
<td>GHG</td>
<td>Greenhouse gas</td>
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<tr>
<td>GSF</td>
<td>Global Shippers’ Forum</td>
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<tr>
<td>IAPH</td>
<td>International Association of Ports and Harbours</td>
</tr>
<tr>
<td>ICAO</td>
<td>International Civil Aviation Organization</td>
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<tr>
<td>ICS</td>
<td>International Chamber of Shipping</td>
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<td>IMO</td>
<td>International Maritime Organization</td>
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<tr>
<td>IPCC</td>
<td>(World) Intergovernmental Panel on Climate Change</td>
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<tr>
<td>IPTA</td>
<td>International Parcel Tankers Association</td>
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<tr>
<td>IUCN</td>
<td>International Union for Conservation of Nature</td>
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<tr>
<td>LCRS</td>
<td>Logistics Carbon Reduction Scheme</td>
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<tr>
<td>LDCS</td>
<td>Least developed countries</td>
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<tr>
<td>LIS</td>
<td>Leveraged Incentive Scheme</td>
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<tr>
<td>MARPOL</td>
<td>International Convention for the Prevention of Pollution from Ships</td>
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<td>MBM</td>
<td>Market-based Measure</td>
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<tr>
<td>MEPC</td>
<td>Marine Environmental Protection Committee</td>
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<tr>
<td>SBSTA</td>
<td>Subsidiary Body of Scientific and Technology Advice</td>
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<tr>
<td>SEEMP</td>
<td>Ship Energy Efficiency Management Plan</td>
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<tr>
<td>SIDS</td>
<td>Small island developing states</td>
</tr>
<tr>
<td>SSI</td>
<td>Sustainable Shipping Initiative</td>
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<tr>
<td>STEEM</td>
<td>Ship Traffic, Energy and Environment Model</td>
</tr>
<tr>
<td>TEU</td>
<td>Twenty foot equivalent unit</td>
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<tr>
<td>VES</td>
<td>Vessel Efficiency System</td>
</tr>
<tr>
<td>UNFCC</td>
<td>United Nations Framework Convention Climate Change</td>
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<tr>
<td>WMU</td>
<td>World Maritime University</td>
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<tr>
<td>WSC</td>
<td>World Shipping Council</td>
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<tr>
<td>WTO</td>
<td>World Trade Organization</td>
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<tr>
<td>$</td>
<td>United States Dollar</td>
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